

REMARKS

Claims 1-3 and 5-8 were pending in this application. Claim 1 has been amended and claims 2 and 3 have been cancelled hereby. Support for the amendment to claim 1 can be found in, for example, now-cancelled claims 2 and 3 and page 9, line 12 through page 10, line 19 of the application. No new matter has been entered. Upon entry of this amendment, claims 1 and 5-8 will be pending herein and are believed to be in condition for allowance for the reasons stated below.

In the Office Action, claims 1-3 and 5-8 were rejected under 35 U.S.C. §103(a) as being unpatentable over Pierrat (US 2004/0053141 A1) in view of Kawamura (US 6,558,853 B1) and Toublan et al. (US 6,807,662 B2). This ground of rejection is respectfully traversed.

Applicants respectfully submit that the reliance on the secondary references of Kawamura and Toublan in the applied prior art rejection is flawed in that both of these secondary references address either a product mask or a rather complicated set of two masks, yet are completely silent with respect to trimming with a second mask.

Nevertheless, in order to advance the prosecution of the instant application, Applicants have elected to add to independent claim 1 the features previously recited in claims 2 and 3, as well as to further recite that the second lateral dimensions of dummy structures are selected in order to improve depth of focus in a combined double exposure by the first and second masks.

More specifically, the invention relates to a set of at least two masks for the projection of patterns, in each case formed on the masks and coordinated with one another, by means of a projection system into the same photosensitive layer arranged on a semiconductor wafer. In particular, an alternating mask, as a primary mask, is assigned to a secondary trim mask for the purpose of avoiding phase conflicts. Furthermore, openings on the trim mask are selected such that the process window is improved during mask projection of the two masks.

This is achieved by the inventive structures on a semitransparent or nontransparent second layer on the second (i.e., trim) mask assigned to the first mask. At least one structure on a semitransparent or nontransparent second layer, which is arranged on a second substrate and in which at least one dummy structure assigned to the first opening, is formed at a second position, the dummy structure having a second lateral dimension, which is smaller than the resolution

limit of the projection system. According to the invention, the combined process window (depth of focus) is improved during subsequent mask projection steps of the two masks by optimizing the openings in the second trim mask.

As indicated by the Examiner, Pierrat fails at least to show that the second mask includes a semitransparent structural element, as well as the other limitations recited in claim 1. For these features, the rejection relies on Kawamura and/or Toublan.

According to Applicants' understanding, Kawamura and Toublan do not address the problem of modifying a second trim mask and improving its performance by specifically addressing to select second lateral dimensions of the dummy structures in order to improve depth of focus in a combined double exposure by first and second mask.

For example, Toublan et al. show a set of two masks for subsequent exposure steps. However, the two mask system of Toublan et al. does not include a second trim mask with a reduced transmission of the semitransparent regions. Accordingly, Toublan et al. merely disclose to combine two masks in order to arrive at a combined layout so as to save costs by avoiding more complicated mask technologies. However, the goal of improving the depth of focus in a combined double exposure by optimizing the openings in the second mask is not addressed at all.

Kawamura also does not disclose a trim mask. Kawamura relates only to product masks. More specifically, Kawamura discloses an exposure mask for transcribing a desired pattern on a resist of a wafer in a photolithography step. This exposure mask is formed by the arrangement of transcribed pattern film formed in a desired pattern on the transparent substrate. In order to decrease background light, a dummy pattern film formed in a dummy pattern is arranged on the transparent substrate together with the transcribed pattern film. Thus Kawamura, like Toublan et al., does not address improved depth of focus using a trim mask.

For at least these reasons, it is believed that the claims now pending in this application are allowable over any combination of Pierrat, Toublan et al. and Kawamura, as no combination of these references provides any indication to modify a second trim mask according to the invention to improve a depth of focus in a combined double exposure by first and second masks.

In view of the foregoing, Applicants respectfully request the Examiner to find the application to be in condition for allowance. However, if for any reason the Examiner feels that the application is not now in condition for allowance, the Examiner is respectfully requested to call the undersigned attorney to discuss any unresolved issues and to expedite the disposition of the application.

Applicants hereby petition for any extension of time that may be necessary to maintain the pendency of this application. The Commissioner is hereby authorized to charge payment of any additional fees required for the above-identified application or credit any overpayment to Deposit Account No. 05-0460.

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